THE OFFICE OF REGULATORY STAFF

DIRECT TESTIMONY & EXHIBITS

OF

GARY C. JONES, P.E.

AUGUST 9, 2012

DOCKET NO: 2012-203-E

Petition of South Carolina Electric & Gas Company for Updates and Revisions to Schedules Related to the Construction of a Nuclear Base Load Generation Facility at Jenkinsville, South Carolina

(Redacted)

DIRECT TESTIMONY & EXHIBITS OF

GARY C. JONES, P.E.

ON BEHALF OF

THE SOUTH CAROLINA OFFICE OF REGULATORY STAFF

DOCKET NO: 2012-203-E

IN RE: PETITION OF SOUTH CAROLINA ELECTRIC & GAS COMPANY FOR UPDATES AND REVISIONS TO SCHEDULES RELATED TO THE CONSTRUCTION OF A NUCLEAR BASE LOAD GENERATION FACILITY AT JENKINSVILLE, SOUTH CAROLINA

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is Gary C. Jones, P.E. I am President of Jones Partners, Ltd., a private consulting engineering firm in the electrical power generation field. My business address is 1222 West George Street, Chicago, Illinois, 60657-4220.

Q. WHAT IS THE NATURE OF YOUR BUSINESS?

A. As a private consultant, I provide professional engineering and consulting services to clients in the electric power industry.

Q. PLEASE STATE YOUR EDUCATIONAL BACKGROUND AND EXPERIENCE.

A. I received a Bachelor of Science degree in Engineering Science from Tennessee Technological University in Cookeville, Tennessee, where I also participated in the Co-Operative Education Program with two one-year assignments at the Oak Ridge National Laboratory in Oak Ridge, Tennessee. I worked for thirty-two years at Sargent & Lundy, LLC, ("S&L") an international architect-engineering and consulting engineering firm in the

electric power industry based in Chicago, Illinois. I held engineering positions of increasing levels of responsibility working on the design, procurement, licensing, construction support and start-up of nuclear power plant projects, culminating in the position as Senior Vice President and one of the owners of the firm for the last sixteen years of my tenure. I led the engineering activities associated with the design of six nuclear power plants at three nuclear power plant stations, including the LaSalle County and Braidwood plants for Commonwealth Edison (now Exelon) and the Marble Hill station for Public Service Indiana. I also led the engineering activities associated with the restarts of the LaSalle County Station Units 1 and 2 and the D.C. Cook Plant after these plants were shut down due to operation concerns. I served for two years as head of the Mechanical Department at S&L. I also led the engineering activities associated with services to numerous operating nuclear power plants, including modifications, technical and economic studies, licensing support, procedure and process development and other consulting services.

Among the most significant assignments on international projects were leading the design review of the first indigenous Chinese nuclear power plant, Qin Shan Unit 1, and participating as a senior member in the design review of the Korean nuclear power plants Yonggwang Units 3 and 4.

Upon my retirement from S&L, I established a private consulting practice, Jones Partners, Ltd., where I continued working in the nuclear power industry for two and a half years until I accepted a position at the International Atomic Energy Agency ("IAEA") in Vienna, Austria. There I was a Senior Engineering Safety Officer in the Engineering Safety Section of the Department of Nuclear Safety and Security. My assignments included

developing international safety standards and performing safety reviews of nuclear power plants. My most significant assignment was leading the safety review of the fifteen operating nuclear power plants in the Ukraine.

Following the completion of my assignment at the IAEA, I returned to private practice as a consultant to the power industry and continue that work today. I am a licensed professional engineer in the States of Missouri and South Carolina. Additional details of my work experience are provided in my resume which I have included as Exhibit GCJ-1.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA ("COMMISSION")?

A. No. However, I have supplied testimony in various licensing, litigation and arbitration proceedings in other venues.

Q. WHAT IS YOUR ASSIGNMENT IN THIS PROCEEDING?

A. My assignment is to assist the South Carolina Office of Regulatory Staff ("ORS") in its monitoring and tracking of the construction schedule and budget related to South Carolina Electric & Gas Company's ("SCE&G" or the "Company") V. C. Summer Units 2 & 3 (the "Units" or the "Project"). I began my assignment with ORS in August 2011.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to provide on behalf of ORS a technical review of specific areas in SCE&G's request for updates and revisions to its capital cost schedule and construction schedule for the Units as delineated in their petition under Docket No. 2012-203-E ("Petition"). The specific areas which I will address are:

- The construction schedule, including the Base Load Review Act ("BLRA") milestones;
- The Engineering, Procurement and Construction Contract ("EPC Contract") cost changes, excluding the Waste Water Discharge Piping and Health Care Costs Change Orders; and,
- The Owners Cost changes.

Other areas of cost changes included in this Petition will be addressed in the testimony of ORS witness Powell.

Q. PLEASE DESCRIBE SCE&G'S REQUEST.

A. SCE&G has filed this update to revise the construction schedules and capital cost schedules approved through Commission Order No. 2011-345, and to supersede and replace the petition filed on February 29, 2012 in Docket No. 2012-90-E. The primary reasons for filing this Petition are:

- To change the construction schedule, including the Substantial Completion Dates for the Units, which reflect the delay incurred due to the timing of receiving the Combined Construction and Operating License ("COL") and other delays associated with construction;
- To change the costs of the Units to reflect changes in the EPC Contract amount;
- To change the costs of the Units to reflect changes in the Owners Cost; and,
- To change costs of the Units to reflect changes to the transmission line costs.

The implications of these changes result in a delay of the Substantial Completion Date of Unit 2 by 11½ months to March 15, 2017 and the acceleration of the Substantial

Completion Date of Unit 3 by 7½ months to May 15, 2018 from those dates previously approved by the Commission of April 1, 2016 and January 1, 2019, respectively. This also results in changes to many of the approved BLRA milestone dates. However, SCE&G indicates that the delay of Unit 2 will not significantly affect the generating capacity during the anticipated peak load in the summer of 2016 and the acceleration of Unit 3 results in cost savings that partially offset the cost increases associated with the delay in the completion date of Unit 2.

With regard to costs, the capital costs in 2007 dollars will increase by $283.0 million, increasing the overall capital cost in 2007 dollars specified in Commission Order No. 2011-345 from $4.270 to $4.553 billion. However, the updated cost schedule in future dollars, including Allowance for Funds Used During Construction, is forecasted to be approximately $5.8 billion, which is $25 million less than the forecast reflected in the most recent Commission Order No. 2011-345. This is due primarily to actual escalation and revised future escalation forecasts being lower than that reflected in the Order.

Q. COULD YOU PLEASE ADDRESS THE CONSTRUCTION SCHEDULE CHANGES AND YOUR REVIEW OF THE CHANGES IN MORE DETAIL?

A. SCE&G has identified three major causes of the 11½ month delay in the Substantial Completion Date of Unit 2. These were:

- The 9 month delay in receiving the COL from the Nuclear Regulatory Commission ("NRC") which issued the COL on March 30, 2012 instead of the originally anticipated July 1, 2011 date;

- A delay of one additional month due to excavated rock conditions for the nuclear island ("NI") basemat for Unit 2 requiring additional fill concrete beyond that originally anticipated; and,
- A delay of an additional 1½ months due to the increased construction time associated with the complexity of the shield building field assembly attributable to design changes.

ORS's review of these changes to the schedule were found to be reasonable. The changes are cumulative in that the work associated with them is sequential (e.g., the basemat concrete pour cannot be performed until the COL is issued) and site-related; therefore, it cannot be performed in parallel or off-site in order to reduce the delay.

In addition to changes to the Substantial Completion Dates, these delays also translate into changes to other construction activities. However, not all activities are affected because some activities are performed off-site and/or are not dependent on site construction. This is particularly true for vendor-supplied equipment fabrication and delivery schedules. In addition, as the Project progresses, knowledge and experience advance and lessons learned are deployed. This means that construction durations are refined and construction sequencing is modified. Therefore, not all activities on the schedule were changed by the same delay interval. In some cases, they were not changed at all. This can readily be seen by a quick review of the BLRA Milestone Comparison table included as Exhibit GCJ-2.

From this Exhibit, one can determine the following with regard to the status of the 146 BLRA Milestones:

- 72 of the milestones are complete with 74 remaining;

- 13 have accelerated dates;
- 48 have delayed dates that vary between 1 to 16 months; and,
- 13 dates remain unchanged.

The Company is still developing a complete and current integrated construction schedule; therefore, it was not available for ORS review. However, SCE&G has revised the major milestones and major portions of the revised construction schedule which were made available and reviewed by ORS to determine whether they represented a reasonable and realistic basis for scheduling Unit 2 construction to meet the revised Substantial Completion Date of March 15, 2017. It should be noted that a detailed integrated schedule based on the previous Substantial Completion Dates had been made available to ORS and was developed to a similar level of detail and in a manner consistent with those schedules for other nuclear power plants with which I have experience. The activities were well defined at a level that can be readily monitored and reported and appeared to be logically sequenced with reasonable durations. It is anticipated that the current version of the integrated schedule will be developed to the same level of detail and in accordance with the same methodology as that previously provided.

Q. WHAT CONCERNS DO YOU SEE IN YOUR REVIEW?

A. It must be noted that the revised construction schedule represents an aggressive and ambitious construction approach that presents a risk to the on-time completion of the Project. While similar projects are meeting and have met similarly aggressive construction schedules in Asia, there is no precedent for attaining similar results on any modern nuclear power plant in the United States. This represents a challenge to the Project that will require rigorous diligence and sustained commitment.

Challenges have already manifested themselves as SCE&G has identified that the Project is currently 63 days behind the most recently revised schedule due to various issues associated with the basemat concrete pour delay. The Company is developing recovery plans to mitigate this delay. In addition, fabrication delays in the structural modules are occurring at the Shaw Modular Solutions ("SMS") facility in Lake Charles, Louisiana. These delays, which have previously been identified in several ORS Quarterly reports, present a potentially significant schedule impact that may present challenges to the construction completion schedule. Although significant and appropriate corrective actions have been taken by Stone and Webster, a subsidiary of the Shaw Group, Inc. ("Shaw"), Westinghouse Electric Company, LLC ("WEC") and SCE&G to address these delays, close monitoring by ORS will continue.

Also, of concern are the potential for additional delays associated with the shield building modules. Fabrication of these shield building components has not yet begun in earnest. Although there are currently no reports of schedule slippage, many of these components are more complex than the structural modules and will present even greater challenges to fabrication and field erection. As stated above, the shield building has already contributed to a 1½ month delay in the Substantial Completion Date of Unit 2, which prompts a concern that there may be more delays associated with these components. The Company must ensure that the shield building modules receive elevated scrutiny and monitoring.

Q. COULD YOU PLEASE DISCUSS FURTHER THE CHANGE IN THE SUBSTANTIAL COMPLETION DATE OF UNIT 3?

A. SCE&G is also requesting that the Substantial Completion Date for Unit 3 be accelerated to May 15, 2018, as compared to the currently approved date of January 1, 2019. The basis for SCE&G's new date is an extrapolation of the draft Consortium COL Delay Study commissioned via Change Order 11 to the EPC Contract which demonstrated that cost savings could be gained by reducing the interval between the Substantial Completion Dates of the Units to 14 months. The basis of this change was reviewed and will be addressed in more detail when the EPC cost changes are summarized later in my testimony. The same review approach was applied as used on Unit 2 and the same results obtained. The changes to the schedule appear to be reasonable and represent a cost effective acceleration of the Unit 3 Substantial Completion Date.

Q. ARE THERE IMPACTS TO THE BLRA MILESTONES THAT RESULT FROM THESE CONSTRUCTION SCHEDULE CHANGES?

A. Yes. Changes to the construction schedule result in changes to the remaining open BLRA milestones, as identified in Exhibit 1 of SCE&G's filing. These changes are reflected on the attached BLRA Milestone Comparison Table, Exhibit GCJ-2, which provides the currently approved date compared with the requested revised milestone date and provides a summary of the reasons for the changes to those milestone dates. These changes were reviewed and were found to be reasonable and in agreement with the revised construction schedule.

Q. WHAT ARE YOUR RECOMMENDATIONS WITH REGARD TO ACCEPTING THE PROPOSED REVISED SUBSTANTIAL COMPLETION DATES AND THE REVISED BLRA MILESTONE COMPLETION DATES CONSIDERING YOUR PREVIOUSLY DISCUSSED CONCERNS?

A. I recommend that the Commission accept the revised Substantial Completion Dates of March 15, 2017 for Unit 2 and May 15, 2018 for Unit 3 as proposed by SCE&G in their filing in Docket No. 2012-203-E. Furthermore, I recommend that the Commission approve the revised BLRA Milestone Schedule proposed in this same filing.

Q. COULD YOU PLEASE ADDRESS THE EPC CONTRACT CHANGES WHICH YOU REVIEWED AND PROVIDE MORE DETAIL ON THE CHANGES AND ON YOUR REVIEW?

A. Yes. In their filing, SCE&G addressed four major reasons for the changes to the EPC Contract, as follows:

- The additional costs incurred as a result of the delay in receiving the COL from the NRC;
- The additional costs associated with the redesign and increased construction costs of the shield building;
- The additional costs incurred as a result of the redesign of the structural modules; and,
- The additional costs incurred as a result of the bedrock under the Unit 2 NI being deeper than the test borings indicated.

In addition, there were three other change orders that impacted the EPC Contract costs and were included in this filing identified as follows:

- Cyber Security,
- Waste Water Discharge Piping, and
- Health Care Costs.

My testimony will address the four major reasons for the EPC cost changes and the Cyber Security change order. ORS witness Powell will address the EPC cost change orders on Waste Water Discharge Piping and Health Care Costs.

It should be noted that the four major reasons for the EPC Contract cost changes were bundled together and negotiated with WEC/Shaw ("Consortium") as a package. As stated by the Company in their filing, these changes were subject to extensive negotiations extending over several months before a compromise was reached and an agreement ("Settlement Agreement") was made to settle these claims for $137.5 million, the amount requested in the filing. This compromise represented a significant reduction from the originally proposed amount of $214 million. This final negotiated value also included a credit of [redacted] from Shaw reflecting an acceleration of potential rebates.

It should also be noted that the negotiated Settlement Agreement also included a change in the escalation rates for the "Firm with Indexed Adjustment Category" of the EPC Contract, wherein this portion will now be escalated at a fixed escalation rate of [redacted] beginning in July 2012 in lieu of the previously specified Handy-Whitman Indices. SCE&G considers this fixed escalation rate to be beneficial by providing more certainty to the final cost of the Project. Although this change is not a patently obvious benefit to SCE&G based on the recent Handy-Whitman indices rates, uncertainties about the future levels of these indices, coupled with the relatively minor impact of this change on the overall costs, indicate that it is reasonable for the Company to reduce their unknown risks by locking in a fixed escalation rate.

Q. COULD YOU PLEASE DISCUSS THE REVIEW OF THE COL DELAY IN MORE DETAIL?

A. Yes. The COL delay was assigned a cost of [redacted] in 2007 dollars in the Settlement Agreement. The draft Consortium COL Delay Study, dated November 4, 2011, which provided the basis for the increased scope and increased costs, was provided for review. An extrapolation of one of the options presented in the study (delaying Unit 2 by nine months instead of the originally stated six months in the study) presented the basis for the cost increases in Unit 2 and the cost decreases in Unit 3 in this Petition. The cost increases for Unit 2 were primarily associated with having construction personnel and equipment on-site for a nine month duration beyond that originally planned with lower productivity because of work restrictions due to the COL delay. The option of demobilizing during this period was considered infeasible because the duration was actually unknown as to when the work could begin and the loss of skilled labor, support personnel and equipment would not have been acceptable. The cost decreases on Unit 3 were due primarily to being able to more efficiently redeploy craft labor, support personnel and equipment from Unit 2 to Unit 3 and to work more areas in parallel.

The review of the basis of the added costs appeared to be reasonable and in-line with the expected values.

Q. COULD YOU PLEASE DISCUSS THE REVIEW OF THE SHIELD BUILDING CHANGES IN MORE DETAIL?

A. Yes. The cost increase associated with the redesign of the shield building represents by far the largest cost component of the four major changes. This cost is [redacted] in 2007 dollars as designated in the Settlement Agreement. Several detailed documents and reports representing well over a thousand pages were provided to ORS to justify this cost increase. These reports and studies supported the claims that the changes were prompted by

revisions in the NRC regulations and changes in the NRC's acceptance criteria. Most, but not all, of the changes can be attributed to the NRC's review of the WEC design, which was prompted by changes to the regulations addressing the need for the structure to resist the effects of an aircraft impact to the shield building. The NRC significantly revised, via Draft Regulatory Guide DG-1176, dated July 2009, the required loading the shield building must accommodate from that which WEC used in the original design of the Units, and which formed the basis of the EPC Contract, as was delineated in Design Control Document ("DCD"), Revision 16.

Another closely related issue was the NRC's refusal to accept the steel/concrete composite ("SCC") wall design which WEC had included in the original design of the Units. This came about via NRC directives issued on October 15, 2009 which rejected the WEC SCC design. This rejection prompted a prolonged series of redesigns by WEC and reviews between the NRC and WEC which culminated in the design represented by DCD, Revision 19, upon which the Project's COL was based and which forms the basis of the current design.

I reviewed these changes to determine whether the settlement amount is reasonable. The design and construction changes were extensive. I summarize some of the major physical changes below, but this does not represent the full extent of these changes:

- The thickness of the faceplates on each side of the shield building walls was increased from 0.5 inches to 0.75 inches and the material was changed from ASTM 572 Grade 65 to Grade 50 in order to increase the tensile strength;
- Over 30,000 tie bars with a diameter of 0.75 inches were added to span between the faceplates to tie them together, and required a penetration

through the faceplates so that they can be welded on the outside of the faceplates;

- Spacing of the Nelson studs, used to bond the concrete to the steel creating a composite unit, was revised to greatly increase the concentration and number of studs on each inside face of the plates;
- Stiffener plates, reinforcing gusset plates and other reinforcement were added in many areas;
- The air vents that provide passive cooling to the containment vessel were revised from a square configuration to be replaced by round 18 inch Schedule 40 pipe, which is a stronger configuration;
- The connections from the SCC areas to areas of reinforced concrete in the basemat and the auxiliary building were changed from hooked rebar to mechanical connections using threaded rebar, bolted to plates or gussets; and,
- The tension rings at the wall to roof connection were changed from I-beams to a box beam configuration with an increased plate thickness.

The changes required extensive redesign, reanalysis, additional procurement, and additional constructability and Project impact reviews. They also required a significant testing and benchmarking program to prove the capabilities of the SCC structure, involving several outside contractors and institutions. Licensing activities associated with the NRC review and the actual fees required by the NRC to perform the review also represented a significant cost.

In addition, the changes resulted in a considerably more complex structure than originally envisioned which dramatically increased the construction costs of the structure, including the shop fabrication costs and the field labor costs. Welding processes and procedures, non-destructive examination ("NDE") processes and procedures and labor skills and quantities were all impacted by these changes. The complexity also dictated the need to build several mock-ups to refine fabrication and field construction activities. The added complexity in the field erection of the shield building has contributed to the delay of the Project by adding another 1½ months to the completion schedule.

Based on the review of the reasons for the changes and the scope and extent of the changes with the resultant impact on the added complexity of the fabrication and erection process, it is my opinion that the costs associated with the changes to the shield building are reasonable.

Q. COULD YOU DISCUSS THE CHANGES TO THE STRUCTURAL MODULES IN MORE DETAIL?

A. Yes. SCE&G provided documentation for ORS's review that outlined the basis for and the extent of changes to the structural modules. The additional costs quoted in the Settlement Agreement associated with the changes to the structural modules are [redacted] in 2007 dollars. The reason for these changes is very similar to that already described for the changes to the shield building. The changes were prompted by the NRC review of the WEC design associated with the final aircraft impact rule by the NRC after the EPC Contract had been signed and the basis for the design of the structural modules set by the EPC Contract. This issue was further complicated by the NRC's refusal to accept the SCC design which had previously been preliminarily accepted by the NRC. This

caused similar, albeit less extensive and less costly, changes to 94 of the 134 structural modules.

An additional issue unique to the structural modules was the use of stainless steel on the inner faceplates which had a different allowable stress value than the carbon steel material on the outer faceplates. Stainless steel was used on those modules that were assumed to be exposed to water during postulated accident events. The NRC insisted, and the American Institute of Steel Construction Code supported their position, that the faceplates of a composite structure must have similar strength properties. Therefore, it was required that the outside faceplate material be changed from the original ASTM A36 to the more compatible ASTM A572, which is a stronger material that has properties more similar to those of stainless steel.

In addition, the following physical changes were also required in order to gain NRC acceptance of the WEC design:

- Nelson stud spacing was changed from a 10"x10" pattern to a 6"x6" pattern. This significantly increases the number of Nelson studs by over 2.5 times the original number; and,
- Mechanical connections with threaded rebars, bolted to reinforced plates at the basemat connections and other high stress area connections were added.

These changes resulted in added costs associated with redesign, reanalysis and additional procurement, additional constructability reviews and schedule impact reviews and adjustments. Licensing costs, including the payment of NRC fees for additional review, increased over the approximately two years of interface with the NRC required to obtain approval of the final design. Finally, as with the shield building, fabrication and field

construction costs for the structural modules increased due to the added complexity and congestion. Welding processes and procedures required revision and requalification and NDE processes and procedures had to be revamped.

Based on the review of the reasons for the changes and the scope and extent of these changes, it is my opinion that the costs quoted in the Settlement Agreement for the structural module changes represent a reasonable cost.

Q. PLEASE PROVIDE MORE DETAIL ON THE REVIEW OF THE BEDROCK ELEVATION ISSUE.

A. With regard to the changes associated with the Unit 2 bedrock elevation issue, the cost of these changes was quoted in the Settlement Agreement as [redacted] in 2007 dollars. The analysis of the basis of this cost increase indicates that the change was caused by an unanticipated local anomaly in the depth of the bedrock under the NI basemat that was not identified in the soil boring data provided to the Consortium. In addition to the costs associated with the additional excavation and fill that was required by the increased depth, the major cost impact is associated with the one month delay in the construction schedule that is attributed to this issue. The delay is protracted because of limitations in the allowable depth of fill concrete (18 inches) that can be poured and the curing time required before an additional pour can be made on top of the first pour. This restriction to 18 inches is required to permit the necessary vibration of the fill concrete to consolidate and compact it. Therefore, this additional depth requires seven additional pours which each require three days to complete. This translates into twenty-one working days which is essentially a calendar month.

Based on the review of this activity and cost of this change, I find the stated cost to be reasonable.

Q. COULD YOU PLEASE DISCUSS THE REVIEW OF THE CYBER SECURITY CHANGE ORDER IN MORE DETAIL?

A. Yes. The final area of my review for the EPC cost increase involves the changes associated with strengthening the plant's defenses against cyber attacks. This cost increase was prompted by the NRC issuance of Regulatory Guide 5.71, "Cyber Security Programs for Nuclear Facilities", dated January 2010, which identifies an acceptable approach to comply with 10 CFR 73.54, "Protection of Digital Computer and Communications Systems and Networks", dated May 2009.

SCE&G elected to approach this work in two phases. Phase I was undertaken for a cost of $914,422 and will more definitively scope the total work that is required by the entire program. Phase I will involve the review of the specific equipment and software of the plant to identify potential vulnerabilities to cyber attack and develop approaches to protect against such attacks. Phase II will complete the programming and other work required to actually protect the potentially vulnerable equipment and software against the identified cyber attacks. The cost of Phase II is estimated at $4.95 million.

SCE&G previously provided ORS with a draft of Change Order No. 14, which formed the basis of the review for this cost change to the EPC Contract. This draft included a detailed scope of work description submitted by the Consortium for Phase I and Phase II, and an analysis of this proposal prepared by SCE&G. Phase I has been essentially completed and is providing the basis for the final estimate for Phase II that is currently under preparation.

The review of the basis of this change establishes a well-defined basis for the performance of Phase I and a good preliminary basis for Phase II. However, Phase II will be better defined based on the results of Phase I and a more detailed and informed estimate will be provided at that time. In addition, there are several aspects of this work that apply generically to the entire generation of U.S. AP-1000 plants and the costs should be shared by all U.S. AP-1000 plants. WEC has acknowledged this sharing, but has not finalized a scheme as to how it will be equitably addressed with regard to the cost implications. The work being performed here explores a new area in the design of nuclear power plants and represents the first effort at attempting to comply with the new NRC requirements. For these reasons, I believe the costs of the Phase I work should be approved, but the $4.95 million cost of the Phase II work should be deferred until a later filing when there is a better definition of the scope and costs and the issue of cost sharing among all U.S. AP-1000 plants has been more clearly defined. Therefore, I recommend that the Commission approve only the $914,422 cost of Phase I of the Cyber Security Change Order Request at this time.

Q. COULD YOU PLEASE SUMMARIZE YOUR RECOMMENDATIONS FOR THE APPROVAL OF THE EPC COSTS COVERED BY YOUR REVIEW?

A. Yes. In summary, I support the $137.5 million adjustment to the EPC Contract associated with the shield building redesign, the structural module redesign, the COL delay, and the Unit 2 rock conditions as requested in the Company's Petition under Docket No. 2012-203-E. In addition, I support the $914,422 adjustment to the EPC Contract representing Phase I of the cyber security issue. I recommend that the costs of $4.95

million representing Phase II of the cyber security change be deferred until additional information is available and that this cost be excluded from this update.

Q. DID YOU ALSO REVIEW THE OWNERS COST UPDATE REQUEST SUBMITTED IN THE SCE&G PETITION UNDER DOCKET 2012-203-E, AND COULD YOU PLEASE SUMMARIZE YOUR REVIEW?

A. Yes. I reviewed the Owners Cost requesting an increase in the SCE&G forecast of approximately $131.6 million. My review included the three major SCE&G program plans and two additional areas of increased costs. The three program plans are identified as the staffing analysis, the software roadmap and the multi-unit facilities study. Documentation on each of these program plans was provided by the Company to ORS for our review. These three areas address a major cost component of the changes in the Owners Cost. The other two cost categories can be classified as non-labor related changes to the operation, maintenance and construction of the Units and miscellaneous cost increases associated with obtaining various site licenses and permits, NRC fees, insurance premiums, recruitment fees for hiring and other costs not readily categorized.

Q. COULD YOU PLEASE DISCUSS THE REVIEW OF THE STAFFING PLAN IN MORE DETAIL?

A. Yes. The costs associated with increased staffing represented by far the most significant portion of the increased Owners Cost. SCE&G advised that in the latter part of 2011 they instituted an extensive review of their staffing levels utilizing a specially constituted panel of experienced personnel to challenge and validate the assumptions on staffing levels with each of their department managers. This resulted in changes to the recommended staffing levels which were reviewed and resulted in an increase of Project

staff by 144 Full Time Employees ("FTE"), comprised of 124 operational and construction FTEs and 20 security FTEs, above those in the approved budget associated with Order 2011-345. The major increases and the bases of these changes are summarized as follows:

- **Operations and Training** – increased by 30 FTEs

  This increase was based on the need to hire and train more operators than originally believed to be required because of the anticipated higher failure rates of operators in their final licensing examinations. This increased failure rate has been experienced industry-wide and locally within the same NRC region (Region II) as the Project.

- **Emergency Planning and Health Physics** – increased by 40 FTEs

  An NRC rulemaking published in November 2011 is requiring a limitation of duties to designated emergency personnel which has resulted in an increase in the number of necessary personnel throughout the nuclear industry. Underlying these new requirements is concern on how to address the emergency response issues resulting from the Fukushima event.

- **Engineering** – increased by 22 FTEs

  Most of the additional engineers (17) are assigned to tasks associated with programs that were originally intended to be developed by the AP-1000 Owners Group ("APOG"). However, the restrictions imposed by WEC on sharing information with utilities that had not signed an EPC Contract has resulted in APOG not being able to fulfill the tasks originally anticipated, which must now be performed by SCE&G and Southern Company alone. The remaining engineers are assigned to program and maintenance support and oversight.

- **Quality Systems** – increased by 20 FTEs

  These additions to the Quality Assurance and Quality Control programs have been identified as required in order to meet SCE&G's obligations for construction and supplier oversight. Quality issues have been identified at several vendors and other subcontractors (e.g., the SMS facility previously discussed) that require an increased number of inspections, audits and reviews. In addition, recent site developments have also indicated the need for increased construction surveillances, inspections, audits and reviews. The current staff of 7 is insufficient to fulfill the functions required as construction and fabrication activities rapidly increase.

- **Security Personnel** – increased by 20 FTEs

  These increases are required in order to meet recent NRC regulations that increased the levels of security required at all U.S. nuclear facilities.

The adjustments in other departments were comparatively minor increases, with the exception of a 16 FTE decrease in the Maintenance Department. This reduction came about in recognition of the ability to share more staff and more skills with the existing V.C. Summer ("VCS") Unit 1 crew.

There were other considerations that also increased the cost of staffing. The most significant of these were the need to account for increased costs due to the COL delay and the need to accelerate the hiring of some staff to reflect the advance in the Unit 3 Substantial Completion Date.

The staffing analysis also indicated cost effective planning because it demonstrated the transfer of selected individuals between the Units and into different roles as the plants

progress through the construction stage and into the testing and operations phases. Reductions in staff at certain appropriate times were also demonstrated.

The staffing increases appear to have a reasonable basis and in many cases were driven by NRC regulatory changes. The final staffing levels are not outside the range of the construction and operations staffing levels on similar plants with which I am familiar. Therefore, I conclude that the requested increase in staffing levels represents a reasonable component of the requested increase in the Owners Cost.

Finally, the cost basis of $72.3 million presented for these staff additions was reviewed against expectations based on my experience and was found to be reasonable and in-line with anticipated staffing costs for similar nuclear power plants with which I am familiar.

Q. COULD YOU PLEASE DISCUSS THE REVIEW OF THE SOFTWARE ROADMAP PROGRAM PLAN IN MORE DETAIL?

A. Yes. SCE&G developed the software roadmap upon the realization that the configuration management and work management systems that were in-place for VCS Unit 1 were inadequate to serve three nuclear units and that their software needed to be further assessed and updated. The software roadmap was developed in conjunction with the corporate Information Technology (IT) group and each of the VCS departments. Each department identified their software needs and presented a business case that justified the need for the software. The corporate IT group coordinated and ensured consistency of the overall software plan.

I reviewed the software plan and found that SCE&G planned to utilize commercially available software with which I am, for the most part, familiar and which is

used on other nuclear power plants of which I have knowledge. However, among their most significant software expenditures will be the purchase of a new configuration management package and an upgrade of their work management system which is based on a proprietary system being developed by [redacted] a small software development company. In both cases, these systems will replace outdated systems currently utilized by VCS Unit 1 which are incapable of effectively serving a multi-unit plant. Both of these software systems will process and store vast amounts of data and will produce valuable work products for the plant. [redacted] is a small company and this system will only be utilized by VCS Units 1, 2 and 3. SCE&G is currently discussing the procurement of configuration software systems with several vendors which have well established programs that are utilized on other nuclear power plants, and with which I am familiar. However, SCE&G is also considering utilizing vendors who do not have well developed programs and are not suppliers to other nuclear power plants. The development and implementation of work management and configuration management software by inexperienced vendors represent some added risk to the Project. These risks have been acknowledged by SCE&G and actions have been taken or assessments are underway to mitigate these risks. This is an area that ORS will specifically monitor.

The other additional software under consideration represents areas where similar software has been applied on other nuclear power plants with which I am familiar, including the following:

- Flow Accelerated Corrosion software for identifying piping and component areas of potential degradation and assessing areas subjected to these adverse effects;

- Air-operated and motor-operated valve testing programs;
- Maintenance Rule implementation and management software; and,
- Whole body counting and radiation exposure monitoring software.

The software plan also addresses on-going software licensing fees and vendor maintenance services. It estimated the costs of these on a reasonable basis, generally assuming 20% of software costs as an annual fee. Costs associated with specific IT hardware required to support the implementation of these programs, such as special cabling, routers, work stations, etc., are also addressed in the plan.

Based on the review of this software plan, the software requirements identified and the costs associated with these additions of $28.7 million appear to be reasonable and consistent with that found on similar nuclear power plants with which I am familiar.

Q. COULD YOU PLEASE ADDRESS YOUR REVIEW OF THE MULTI-UNIT FACILITIES PLAN?

A. Yes. The multi-unit facilities study represented a comprehensive assessment of all new and existing facilities that may be required by the entire nuclear complex represented by VCS Units 1, 2 and 3. Not all facilities included in this report ("Facilities Plan") were fully developed as far as conceptual planning and cost estimates. Also, some of the facilities were not assigned to the budgets for Units 2 and 3, but were to be paid for by corporate or exclusively by VCS Unit 1. In the case of the Nuclear Operations Building, the majority of the costs necessary to construct this facility have been previously approved by the Commission. The amount represented in the Company's current filing represents an increase to the previously approved amount. However, the following near term facilities were sufficiently developed to include in this update and have a cost component assigned

to Units 2 and 3. In some cases, the costs of each of these buildings represent an allocation among VCS Units 1, 2 and 3 of the total cost of the facility since they will be shared among all three VCS units. Therefore, this review addresses only the following facilities:

- **Maintenance of Existing Facilities** – increased by $1.9 million

  This is the largest component of cost within the increase identified by the Facilities Plan. The increased levels of staffing and the acceleration of the timing of hiring the staff result in the increases in the maintenance and operational cost of these buildings.

- **Service Building Furnishings** – increased by $1.3 million

  The cost of constructing the Service Building is included in the EPC Contract; however, it did not include the costs associated with furnishing and equipping the Service Building. The review associated with developing the Facilities Plan identified this circumstance and this increase addresses this need.

- **Maintenance Facilities** – increased by $1.4 million

  Similar to the Service Building, the cost of the Maintenance Facilities are included in the EPC Contract, but not the furnishings, tools or equipment. This increase reflects these additional costs.

- **Nuclear Operations Building ("NOB")** – increased by $0.7 million

  The increased staffing levels required a reconfiguration and reallocation of the NOB. This cost reflects these changes.

- **Emergency Services Building** – increased by $1.0 million

The increased emergency services personnel and equipment mandated by the changes in NRC requirements and the upcoming changes associated with the lessons learned from the Fukushima event required this additional facility to be built.

- **Main Access and Plant Access Facilities** – increased by $1.0 million

  Although the Main Access Facility met the minimum regulatory requirements, SCE&G elected to increase the security of this building by hardening it to better withstand credible security threats and improve the overall security access to the V.C. Summer Plant. In addition, the equipment, furnishings and fixtures of both the Main Access and Plant Access Facilities could not be finalized until the designs of these facilities were available. The increased costs now reflect the addition of this equipment, furnishings and fixtures.

- **Temporary/Modular Buildings** – increased by $1.0 million

  Additional temporary office space is required to accommodate the larger staff and accelerated hiring during the construction phase of the Project and until the permanent facilities are completed and ready for occupancy.

These increases are partially offset by an approximately $0.5 million reduction in the security training classroom facilities, making the total increase $7.8 million. Based on the review of the Facilities Plan and subsequent discussions with SCE&G, I find these cost increases to be justified and reasonable.

Q. WHAT IS YOUR RECOMMENDATION WITH REGARD TO THE APPROVAL OF THE OWNERS COST?

A. Based on the review as summarized above, I have determined that the $131.6 million for the increased Owners Cost, as stated in the Petition filed under Docket No. 2012-203-E represents a reasonable cost increase for the Project.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

GARY C. JONES

Curriculum Vitae

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EXPERTISE:

- Power Plant Design
- System Design and Engineering
- Safety Reviews
- Project Management
- Engineering Management
- Quality Improvement
- Safety Standards Development
- Project Development
- Reengineering
- Business Management
- Executive Consulting
- Resource Allocation
- International Business
- Application of Safety Standards

PROFESSIONAL EXPERIENCE:

December 2008 –Present **JONES PARTNERS, LTD., Chicago, IL, USA**

President

Leader of a private energy consulting firm. Providing confidential nuclear power plant engineering consulting services to a large European nuclear steam supply system contractor and to the South Carolina Office of Regulatory Staff. Provided consulting engineering services to the International Atomic Energy Agency on the safety review of Ukrainian nuclear power plants in 2009 and served in July 2011 as part of the team to review the Egyptian Request for Proposal for their first nuclear power plant. Instructor at ASME seminar on new nuclear power plant system design in June 2009 in Atlanta, GA, June 2010 in Bethesda, MD, June 2011 in Columbia, SC and June 2012 in Augusta, GA.

July 2006 – November 2008 **INTERNATIONAL ATOMIC ENERGY AGENCY, Vienna, Austria**

Senior Engineering Safety Officer

Team leader in the development, review and revision of international nuclear safety standards and in assisting IAEA Member States in the application of these safety standards to their nuclear facilities through workshops, training courses, missions, conferences, seminars, scientific visits and other means. Project Manager of a multi-million dollar European Commission funded program to assess the compliance of the 15 Ukrainian nuclear power plants with IAEA Safety Standards.

2004 – July 2006 **JONES PARTNERS, LTD., Chicago, IL, USA**

President

Leader of a private energy consulting and real estate investment firm.

1971 – 2003 **SARGENT & LUNDY, LLC, Chicago, IL**

1988-2003 **Sr. Vice President/Owner**

- Led a multi-million dollar global consulting organization to perform high level, quality driven consulting assignments in the development, assessment, design, construction and operation of power facilities.

- Led the engineering and design for the restart of nuclear power plants and directed staff in all disciplines associated with plant restart, providing licensing interface and analytical support for submissions to the Nuclear Regulatory Commission.

- Provided the full range of architect-engineering services to support the on-going operation of nuclear power plants including safety review, licensing and regulatory support, corrective action programs and procedure and test review.

- Served as Mechanical Department Manager and executive in charge of all mechanical discipline resources in the company including standards, software, recruitment, project staffing, training, quality performance and budget.

- Developed strategies and resources to increase business creating a profitable, respected organization; ensured financial performance, technical compliance and human resource management and development.

- Directed the assessment and implementation of the Sargent & Lundy conversion from a partnership to a Limited Liability company; managed the development and implementation of regional offices.

- **SELECTED LEADERSHIP ROLES INCLUDE:**

    - Served as interim Mechanical and Structural Chief Engineer for Commonwealth Edison Company Nuclear Division responsible for oversight and corporate engineering at all nuclear power plants.

    - Senior review board member for the Dresden Integrated System Inspection.

    - Independent safety review for Peoples Republic of China's first indigenous nuclear power plant, Qin Shan, including visits to the PRC and interface with the Shanghai Nuclear Engineering Design Institute.

    - Independent design review of Korea Electric Power Corporation/Korea Power Engineering Company Yonggwang 3 and 4 nuclear power plant.

    - Developed industry standards, guidelines and software applications in conjunction with the Electric Power Research Institute.

    - Remediation and decommissioning studies and assessments for Savannah River and Argonne National Laboratory environmental cleanup of nuclear and hazardous wastes.

    - Root cause investigations to determine reasons for failure and recommendations for fixes of various power plant systems including diesel generators, pumps, valves and other major components and systems.

- Development and implementation of new business strategies, processes, standards and procedures as Executive Director of Nuclear Services.

- Company-wide Malcolm Baldrige self-assessment and the Total Quality Management implementation in addition to special post-implementation assessment teams.

1976-1988 Associate/Project Manager, Sr. Mechanical Project Engineer

- Planned, coordinated and monitored performance for full scope engineering and design projects for Commonwealth Edison's Braidwood and Indiana's Marble Hill nuclear stations.
- Managed 1,500 engineering personnel assigned to projects.
- Project Manager for Design Basis Verification Program at TVA's Watts Bar Nuclear power plant.
- Led the mechanical Nuclear Steam Supply System process and physical engineering and design for Commonwealth Edison's dual unit LaSalle nuclear power station.
- Served as principal technical interface and author of the LaSalle County Station Final Safety Analysis report.

1971-1976 Mechanical Engineer

- Performed engineering duties for multiple nuclear power plants.

1966-1967 OAK RIDGE NATIONAL LABORATORY, Oak Ridge, TN, USA
1968-1969

Cooperative Education Assignments

- Radioisotopes Division
- Reactor Operations Division

EDUCATION:

- Bachelor of Science, Engineering Science – Mechanical and Nuclear Tennessee Technological University in Cookeville, TN
- University of Michigan Executive Program

REGISTRATIONS:

- Professional Engineer – Missouri and South Carolina

ASSOCIATIONS:

- American Nuclear Society
- American Society of Mechanical Engineers
- Founder, Past President and current Vice President of the Engineers Without Borders-USA-Chicagoland Professional Chapter
- Member of the Great Lakes Region Technical Advisory Committee of Engineers Without Borders-USA
- Board Member of SALUTE, Inc., a non-profit organization assisting military service personnel and their families

BLRA Order No. 2010-12 and Docket No. 2012-203-E Revised Milestones Comparison
VC Summer Units 2 and 3

Exhibit GCJ-2

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
1	Approve Engineering Procurement and Construction Agreement	Complete	Complete		
2	Issue P.O.'s to nuclear component fabricators for Units 2 and 3 Containment Vessels	Complete	Complete		
3	Contractor Issue PO to Passive Residual Heat Removal Heat Exchanger Fabricator - First Payment - Unit 2	Complete	Complete		
4	Contractor Issue PO to Accumulator Tank Fabricator - Unit 2	Complete	Complete		
5	Contractor Issue PO to Core Makeup Tank Fabricator - Units 2 & 3	Complete	Complete		
6	Contractor Issue PO to Squib Valve Fabricator - Units 2 & 3	Complete	Complete		
7	Contractor Issue PO to Steam Generator Fabricator - Units 2 & 3	Complete	Complete		
8	Contractor Issue Long Lead Material PO to Reactor Coolant Pump Fabricator - Units 2 & 3	Complete	Complete		
9	Contractor Issue PO to Pressurizer Fabricator - Units 2 & 3	Complete	Complete		
10	Contractor Issue PO to Reactor Coolant Loop Pipe Fabricator - First Payment - Units 2 & 3	Complete	Complete		
11	Reactor Vessel Internals - Issue Long Lead Material PO to Fabricator - Units 2 and 3	Complete	Complete		
12	Contractor Issue Long Lead Material PO to Reactor Vessel Fabricator - Units 2 & 3	Complete	Complete		
13	Contractor Issue PO to Integrated Head Package Fabricator - Units 2 & 3	Complete	Complete		
14	Control Rod Drive Mechanism Issue PO for Long Lead Material to Fabricator - Units 2 and 3 - first payment	Complete	Complete		
15	Issue P.O.'s to nuclear component fabricators for Nuclear Island structural CA20 Modules	Complete	Complete		

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BLRA Order No. 2010-12 and Docket No. 2012-203-E Revised Milestones Comparison VC Summer Units 2 and 3

Exhibit GCJ-2

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
16	Start Site Specific and balance of plant detailed design	Complete	Complete		
17	Instrumentation & Control Simulator - Contractor Place Notice to Proceed - Units 2 & 3	Complete	Complete		
18	Steam Generator - Issue Final PO to Fabricator for Units 2 and 3	Complete	Complete		
19	Reactor Vessel Internals - Contractor Issue PO for Long Lead Material (Heavy Plate and Heavy Forgings) to Fabricator - Units 2 & 3	Complete	Complete		
20	Contractor Issue Final PO to Reactor Vessel Fabricator - Units 2 & 3	Complete	Complete		
21	Variable Frequency Drive Fabricator Issue Transformer PO - Units 2 & 3	Complete	Complete		
22	Start clearing, grubbing and grading	Complete	Complete		
23	Core Makeup Tank Fabricator Issue Long Lead Material PO - Units 2 & 3	Complete	Complete		
24	Accumulator Tank Fabricator Issue Long Lead Material PO - Units 2 & 3	Complete	Complete		
25	Pressurizer Fabricator Issue Long Lead Material PO - Units 2 & 3	Complete	Complete		
26	Reactor Coolant Loop Pipe - Contractor Issue PO to Fabricator - Second Payment - Units 2 & 3	Complete	Complete		
27	Integrated Head Package - Issue PO to Fabricator - Units 2 and 3 - second payment	Complete	Complete		
28	Control Rod Drive Mechanisms - Contractor Issue PO for Long Lead Material to Fabricator - Units 2 & 3	Complete	Complete		
29	Contractor Issue PO to Passive Residual Heat Removal Heat Exchanger Fabricator - Second Payment - Units 2 & 3	Complete	Complete		
30	Start Parr Road intersection work.	Complete	Complete		

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VC Summer Units 2 and 3

Exhibit GCJ-2

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
31	Reactor Coolant Pump - Issue Final PO to Fabricator - Units 2 and 3	Complete	Complete		
32	Integrated Heat Packages Fabricator Issue Long Lead Material PO - Units 2 & 3	Complete	Complete		
33	Design Finalization Payment 3	Complete	Complete		
34	Start site development	Complete	Complete		
35	Contractor Issue PO to Turbine Generator Fabricator - Units 2 & 3	Complete	Complete		
36	Contractor Issue PO to Main Transformers Fabricator - Units 2 & 3	Complete	Complete		
37	Core Makeup Tank Fabricator Notice to Contractor Receipt of Long Lead Material - Units 2 & 3	Complete	Complete		
38	Design Finalization Payment 4	Complete	Complete		
39	Turbine Generator Fabricator Issue PO for Condenser Material - Unit 2	Complete	Complete		
40	Reactor Coolant Pump Fabricator Issue Long Lead Material Lot 2 - Units 2 & 3	Complete	Complete		
41	Passive Residual Heat Removal Heat Exchanger Fabricator Receipt of Long Lead Material - Units 2 & 3	Complete	Complete		
42	Design Finalization Payment 5	Complete	Complete		
43	Start erection of construction buildings, to include craft facilities for personnel, tools, equipment; first aid facilities; field offices for site management and support personnel; temporary warehouses; and construction hiring office.	Complete	Complete		
44	Reactor Vessel Fabricator Notice to Contractor of Receipt of Flange Nozzle Shell Forging - Unit 2	Complete	Complete		
45	Design Finalization Payment 6	Complete	Complete		

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BLRA Order No. 2010-12 and Docket No. 2012-203-E Revised Milestones Comparison Exhibit GCJ-2
VC Summer Units 2 and 3

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
46	Instrumentation and Control Simulator - Contractor Issue PO to Subcontractor for Radiation Monitor System - Units 2 & 3	Complete	Complete		
47	Reactor Vessel Internals - Fabricator Start Fit and Welding of Core Shroud Assembly - Unit 2	Complete	Complete		
48	Turbine Generator Fabricator Issue PO for Moisture Separator Reheater/Feedwater Heater Material - Unit 2	Complete	Complete		
49	Reactor Coolant Loop Pipe Fabricator Acceptance of Raw Material - Unit 2	Complete	Complete		
50	Reactor Vessel Internals - Fabricator Start Weld Neutron Shield Spacer Pads to Assembly - Unit 2	10/31/2011	7/31/2012	Unit 2	Due to schedule refinement and sequencing.
51	Control Rod Drive Mechanisms - Fabricator to Start Procurement of Long Lead Material - Unit 2	Complete	Complete		
52	Contractor Notified that Pressurizer Fabricator Performed Cladding on Bottom Head - Unit 2	Complete	Complete		
53	Start excavation and foundation work for the standard plant for Unit 2	Complete	Complete		
54	Steam Generator Fabricator Notice to Contractor of Receipt of 2nd Steam Generator Tubesheet Forging - Unit 2	Complete	Complete		
55	Reactor Vessel Fabricator Notice to Contractor of Outlet Nozzle Welding to Flange Nozzle Shell Completion - Unit 2	Complete	Complete		
56	Turbine Generator Fabricator Notice to Contractor Condenser Fabrication Started - Unit 2	Complete	Complete		
57	Complete preparations for receiving the first module on site for Unit 2.	Complete	Complete		
58	Steam Generator Fabricator Notice to Contractor of Receipt of 1st Steam Generator Transition Cone Forging - Unit 2	Complete	Complete		

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VC Summer Units 2 and 3

Exhibit GCJ-2

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
59	Reactor Coolant Pump Fabricator Notice to Contractor of Manufacturing of Casing Completion - Unit 2	Complete	Complete		
60	Reactor Coolant Loop Pipe Fabricator Notice to Contractor of Machining, Heat Treating & Non-Destructive Testing Completion - Unit 2	Complete	Complete		
61	Core Makeup Tank Fabricator Notice to Contractor of Satisfactory Completion of Hydrotest - Unit 2	5/31/2011	9/30/2012	Unit 2	Due to vendor delays, COL approval and schedule refinement and sequencing.
62	Polar Crane Fabricator Issue PO for Main Hoist Drum and Wire Rope - Units 2 & 3	Complete	Complete		
63	Control Rod Drive Mechanisms - Fabricator to Start Procurement of Long Lead Material - Unit 3	Complete	Complete		
64	Turbine Generator Fabricator Notice to Contractor Condenser Ready to Ship - Unit 2	Complete	Complete		
65	Start placement of mud mat for Unit 2	7/14/2011	6/29/2012	Unit 2	COL approval and additional fill concrete in the nuclear island.
66	Steam Generator Fabricator Notice to Contractor of Receipt of 1st Steam Generator Tubing - Unit 2	Complete	Complete		
67	Pressurizer Fabricator Notice to Contractor of Welding of Upper and Intermediate Shells Completion - Unit 2	Complete	Complete		
68	Reactor Vessel Fabricator Notice to Contractor of Closure Head Cladding Completion - Unit 3	2/28/2012	6/30/2012	Unit 3	Due to schedule refinement and review.
69	Begin Unit 2 first nuclear concrete placement	10/3/2011	8/24/2012	Unit 2	COL approval and additional fill concrete in the nuclear island.

BLRA Order No. 2010-12 and Docket No. 2012-203-E Revised Milestones Comparison VC Summer Units 2 and 3

Exhibit GCJ-2

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
70	Reactor Coolant Pump Fabricator Notice to Contractor of Stator Core Completion - Unit 2	Complete	Complete		
71	Fabricator Start Fit and Welding of Core Shroud Assembly - Unit 2	Complete	Complete		
72	Steam Generator Fabricator Notice to Contractor of Completion of 1st Steam Generator Tubing Installation - Unit 2	Complete	Complete		
73	Reactor Coolant Loop Pipe - Shipment of Equipment to Site - Unit 2	12/31/2012	12/31/2012	Unit 2	On schedule.
74	Control Rod Drive Mechanism - Ship Remainder of Equipment (Latch Assembly & Rod Travel Housing) to Head Supplier - Unit 2	12/31/2011	6/30/2012	Unit 2	Due to delay in predecessor schedule activities.
75	Pressurizer Fabricator Notice to Contractor of Welding of Lower Shell to Bottom Head Completion - Unit 2	Complete	Complete		
76	Steam Generator Fabricator Notice to Contractor of Completion of 2nd Steam Generator Tubing Installation - Unit 2	6/30/2011	5/31/2012	Unit 2	This milestone completed in May 2012.
77	Design Finalization Payment 14	Complete	Complete		
78	Set module CA04 for Unit 2	1/27/2012	11/6/2012	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.
79	Passive Residual Heat Removal Heat Exchanger Fabricator Notice to Contractor of Final Post Weld Heat Treatment - Unit 2	Complete	Complete		
80	Passive Residual Heat Removal Heat Exchanger Fabricator Notice to Contractor of Completion of Tubing - Unit 2	1/31/2011	5/31/2012	Unit 2	This milestone completed in May 2012.
81	Polar Crane Fabricator Notice to Contractor of Girder Fabrication Completion - Unit 2	2/28/2012	10/31/2012	Unit 2	Due to schedule refinement and review.

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BLRA Order No. 2010-12 and Docket No. 2012-203-E Revised Milestones Comparison
VC Summer Units 2 and 3

Exhibit GCJ-2

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
82	Turbine Generator Fabricator Notice to Contractor Condenser Ready to Ship - Unit 3	8/31/2013	8/31/2013	Unit 3	On schedule.
83	Set Containment Vessel ring #1 for Unit 2	4/3/2012	1/7/2013	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.
84	Reactor Coolant Pump Fabricator Delivery of Casings to Port of Export - Unit 2	3/31/2012	7/31/2012	Unit 2	Due to schedule refinement and review.
85	Reactor Coolant Pump Fabricator Notice to Contractor of Stator Core Completion - Unit 3	8/31/2013	8/31/2013	Unit 3	On schedule.
86	Reactor Vessel Fabricator Notice to Contractor of Receipt of Core Shell Forging - Unit 3	Complete	Complete		
87	Contractor Notified that Pressurizer Fabricator Performed Cladding on Bottom Head - Unit 3	Complete	Complete		
88	Set Nuclear Island structural module CA03 for Unit 2	8/30/2012	6/26/2013	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.
89	Squib Valve Fabricator Notice to Contractor of Completion of Assembly and Test for Squib Valve Hardware - Unit 2	5/31/2012	5/31/2012	Unit 2	On schedule.
90	Accumulator Tank Fabricator Notice to Contractor of Satisfactory Completion of Hydrotest - Unit 3	12/31/2012	3/31/2013	Unit 3	Due to schedule refinement and review.
91	Polar Crane Fabricator Notice to Contractor of Electric Panel Assembly Completion - Unit 2	7/31/2012	3/31/2013	Unit 2	Due to schedule refinement and review.
92	Start containment large bore pipe supports for Unit 2	4/9/2012	6/28/2013	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.

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BLRA Order No. 2010-12 and Docket No. 2012-203-E Revised Milestones Comparison Exhibit GCJ-2
VC Summer Units 2 and 3

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
93	Integrated Head Package - Shipment of Equipment to Site - Unit 2	10/31/2012	3/31/2013	Unit 2	Due to schedule refinement and review.
94	Reactor Coolant Pump Fabricator Notice to Contractor of Final Stator Assembly Completion - Unit 2	11/30/2012	5/31/2013	Unit 2	Due to delay in predecessor schedule activities.
95	Steam Generator Fabricator Notice to Contractor of Completion of 2nd Steam Generator Tubing Installation - Unit 3	5/31/2013	6/30/2013	Unit 3	Due to schedule refinement and review.
96	Steam Generator Fabricator Notice to Contractor of Satisfactory Completion of 1st Steam Generator Hydrotest - Unit 2	5/31/2012	1/31/2013	Unit 2	Due to COL approval and schedule refinement and sequencing.
97	Start concrete fill of Nuclear Island structural modules CA01 and CA02 for Unit 2	2/26/2013	4/3/2014	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.
98	Passive Residual Heat Removal Heat Exchanger - Delivery of Equipment to Port of Entry - Unit 2	4/30/2012	12/31/2012	Unit 2	Due to schedule refinement and sequencing.
99	Refueling Machine Fabricator Notice to Contractor of Satisfactory Completion of Factory Acceptance Test - Unit 2	2/28/2013	11/30/2013	Unit 2	Due to delay in predecessor schedule activities.
100	Deliver Reactor Vessel Internals to Port of Export - Unit 2	7/31/2013	1/31/2014	Unit 2	Due to schedule refinement and sequencing.
101	Set Unit 2 Containment Vessel #3	4/17/2013	4/24/2014	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.
102	Steam Generator - Contractor Acceptance of Equipment at Port of Entry - Unit 2	3/31/2013	7/31/2013	Unit 2	Due to schedule refinement and review.
103	Turbine Generator Fabricator Notice to Contractor Turbine Generator Ready to Ship - Unit 2	4/30/2013	4/30/2013	Unit 2	On schedule.

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VC Summer Units 2 and 3

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
104	Pressurizer Fabricator Notice to Contractor of Satisfactory Completion of Hydrotest - Unit 3	2/28/2014	3/31/2014	Unit 3	Due to schedule refinement and sequencing.
105	Polar Crane - Shipment of Equipment to Site - Unit 2	5/31/2013	1/31/2014	Unit 2	Due to schedule refinement and sequencing.
106	Receive Unit 2 Reactor Vessel on site from fabricator	5/20/2013	5/13/2014	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.
107	Set Unit 2 Reactor Vessel	6/18/2013	6/23/2014	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.
108	Steam Generator Fabricator Notice to Contractor of Completion of 2nd Channel Head to Tubesheet Assembly Welding - Unit 3	12/31/2013	12/31/2013	Unit 3	On schedule.
109	Reactor Coolant Pump Fabricator Notice to Contractor of Final Stator Assembly Completion - Unit 3	8/31/2014	8/31/2014	Unit 3	On schedule.
110	Reactor Coolant Pump - Shipment of Equipment to Site (2 Reactor Coolant Pumps) - Unit 2	9/30/2013	10/31/2013	Unit 2	Due to schedule refinement and review.
111	Place first nuclear concrete for Unit 3	8/1/2013	10/9/2013	Unit 3	The Unit 3 FNC was offset by 14 months from the Unit 2 FNC per agreement between SCE&G & Consortium.
112	Set Unit 2 Steam Generator	9/9/2013	10/23/2014	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.
113	Main Transformers Ready to Ship - Unit 2	9/30/2013	9/30/2013	Unit 2	On schedule.
114	Complete Unit 3 Steam Generator Hydrotest at fabricator	2/28/2014	2/28/2014	Unit 3	On schedule.

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VC Summer Units 2 and 3

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
115	Set Unit 2 Containment Vessel Bottom Head on basemat legs	11/21/2011	10/11/2012	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.
116	Set Unit 2 Pressurizer Vessel	1/24/2014	5/16/2014	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.
117	Reactor Coolant Pump Fabricator Notice to Contractor of Satisfactory Completion of Factory Acceptance Test - Unit 3	2/28/2015	2/28/2015	Unit 3	On schedule.
118	Deliver Reactor Vessel Internals to Port of Export - Unit 3	6/30/2015	6/30/2015	Unit 3	On schedule.
119	Main Transformers Fabricator Issue PO for Material - Unit 3	4/30/2014	2/28/2015	Unit 3	Due to schedule refinement and review.
120	Complete welding of Unit 2 Passive Residual Heat Removal System piping	3/19/2014	2/5/2015	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.
121	Steam Generator - Contractor Acceptance of Equipment at Port of Entry - Unit 3	4/30/2015	4/30/2015	Unit 3	On schedule.
122	Refueling Machine - Shipment of Equipment to Site - Unit 3	5/31/2014	2/28/2015	Unit 3	Due to schedule refinement and review.
123	Set Unit 2 Polar Crane	4/3/2014	1/9/2015	Unit 2	COL approval, additional fill concrete in the nuclear island, and schedule sequencing and detailing.
124	Reactor Coolant Pumps - Shipment of Equipment to Site - Unit 3	6/30/2015	6/30/2015	Unit 3	On schedule.
125	Main Transformers Ready to Ship - Unit 3	9/30/2014	7/31/2015	Unit 3	Due to schedule refinement and review.

Provided by South Carolina Electric & Gas Company at the request of ORS

BLRA Order No. 2010-12 and Docket No. 2012-203-E Revised Milestones Comparison Exhibit GCJ-2
VC Summer Units 2 and 3

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
126	Spent Fuel Storage Rack - Shipment of Last Rack Module - Unit 3	12/31/2014	7/31/2014	Unit 3	Due to schedule refinement and review.
127	Start electrical cable pulling in Unit 2 Auxillary Building	12/26/2014	8/14/2013	Unit 2	COL approval, additional fill concreted for nuclear island and schedule sequencing and detailing.
128	Complete Unit 2 Reactor Coolant System cold hydro	8/3/2015	1/22/2016	Unit 2	COL approval, additional fill concreted for nuclear island, additional duration for Shield Bldg construction, and schedule sequencing and detailing.
129	Activate class 1E DC power in Unit 2 Auxilary Building.	3/5/2015	3/15/2015	Unit 2	COL approval, additional fill concreted for nuclear island and schedule sequencing and detailing.
130	Complete Unit 2 hot functional test.	9/21/2015	5/3/2016	Unit 2	COL approval, additional fill concreted for nuclear island, additional duration for Shield Bldg construction, and schedule sequencing and detailing.
131	Install Unit 3 ring 3 for containment vessel	7/30/2015	8/25/2015	Unit 3	Schedule sequencing and detailing.
132	Load Unit 2 nuclear fuel	10/28/2015	9/15/2016	Unit 2	COL approval, additional fill concreted for nuclear island, additional duration for Shield Bldg construction, and schedule sequencing and detailing.

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VC Summer Units 2 and 3

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
133	Unit 2 Substantial Completion	4/1/2016	3/15/2017	Unit 2	COL approval, additional fill concreted for nuclear island, additional duration for Shield Bldg construction, and schedule sequencing and detailing.
134	Set Unit 3 Reactor Vessel	10/1/2015	10/22/2015	Unit 3	Schedule sequencing and detailing.
135	Set Unit 3 Steam Generator #2	12/22/2015	2/25/2016	Unit 3	Schedule sequencing and detailing.
136	Set Unit 3 Pressurizer Vessel	5/16/2016	7/16/2015	Unit 3	Schedule sequencing, detailing and compression.
137	Complete welding of Unit 3 Passive Residual Heat Removal System piping	6/20/2016	6/16/2016	Unit 3	Schedule sequencing and detailing.
138	Set Unit 3 polar crane	7/18/2016	5/9/2016	Unit 3	Schedule sequencing, detailing and compression.
139	Start Unit 3 Shield Building roof slab rebar placement	1/16/2017	5/26/2016	Unit 3	Schedule sequencing, detailing and compression.
140	Start Unit 3 Auxiliary Building electrical cable pulling	4/6/2017	11/7/2014	Unit 3	Schedule sequencing and detailing.
141	Activate Unit 3 Auxiliary Building class 1E DC power	6/9/2017	5/15/2016	Unit 3	Unit 3 substantial completion 14 months after Unit 2 substantial completion.
142	Complete Unit 3 Reactor Coolant System cold hydro	1/1/2018	3/22/2017	Unit 3	Unit 3 substantial completion 14 months after Unit 2 substantial completion.

BLRA Order No. 2010-12 and Docket No. 2012-203-E Revised Milestones Comparison Exhibit GCJ-2
VC Summer Units 2 and 3

Tracking ID	Milestone Description	Order No. 2010-12 Date	Docket No. 2012-203-E Revised Completion Date	Unit	Explanation
143	Complete Unit 3 hot functional test	2/15/2018	7/3/2017	Unit 3	Unit 3 substantial completion 14 months after Unit 2 substantial completion.
144	Complete Unit 3 nuclear fuel load	7/31/2018	11/15/2017	Unit 3	Unit 3 substantial completion 14 months after Unit 2 substantial completion.
145	Begin Unit 3 full power operation	10/31/2018	4/8/2018	Unit 3	Unit 3 substantial completion 14 months after Unit 2 substantial completion.
146	Unit 3 Substantial Completion	1/1/2019	5/15/2018	Unit 3	Unit 3 substantial completion 14 months after Unit 2 substantial completion.